

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Linum carteri* var. *carteri* Small

COMMON NAME: Carter's small-flowered flax

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species? No

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

☐ Listing priority change

Former LP: ☐

New LP: ____

Date when the species first became a Candidate (as currently defined): October 25, 1999

____ Candidate removal: Former LP: ____

____ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

____ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

____ F – Range is no longer a U.S. territory.

____ I – Insufficient information exists on biological vulnerability and threats to support listing.

____ M – Taxon mistakenly included in past notice of review.

____ N – Taxon does not meet the Act's definition of "species."

____ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering Plants, Linaceae, Flax Family

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida, U.S.A.

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida, Miami-Dade County, U.S.A.

LAND OWNERSHIP

Linum carteri var. *carteri* populations with fewer than 100 total individuals are located at Camp Owaissa Bauer and R. Hardy Matheson Preserve, managed by Miami-Dade County. The species is also present at the County's Rockdale Pineland (Gann et al. 2002). One site is within a U.S. Department of Agriculture research facility. The other known sites are located on private, non-protected lands and are subject to development. The private sites appear to be considerably smaller than the protected ones. There is little opportunity to protect this plant through land acquisition.

LEAD REGION CONTACT: Richard Gooch, 404-679-7124

LEAD FIELD OFFICE CONTACT: South Florida Ecological Services Office, David Martin, 772-562-3909 ext 230

BIOLOGICAL INFORMATION

Species Description: *Linum carteri* var. *carteri* is an erect, annual or short-lived perennial herb, often with several stems 23-36 centimeters (roughly 1 foot) tall. The stems are puberulent (with fine, short hairs). The leaves are slender, 1.8-2.6 cm long, entire, alternate, closely overlapping at the base of stem, more distant above; stipules of leaves with paired dark glands; flowers are arranged in an ascending or spreading cyme; pedicels 4.5-9 millimeters (0.18-0.35 inches) long

in fruit; sepals lanceolate, short-awned, glandular toothed, 3-nerved. The flower petals are orange-yellow and 9-17 mm (0.35-0.67 inches) long. The petals fall readily. The fruit is straw-colored, ovoid, 4.1-4.6 mm (0.16-0.18 inch) long, 3.4-3.7 mm (0.13-0.15 inch) in diameter, breaking apart into five 2-seeded segments; seeds narrowly ovoid-elliptic, 2.3-2.8 mm (0.90-0.098 inches) long, 1-1.3 mm (0.04-0.05 inch) wide (Bradley and Gann 1999, adapted from Rogers 1963 and 1968). “In habit and flower the plant closely resembles pitted stripe seed (*Piriqueta caroliniana*).” (Bradley and Gann 1999).

Taxonomy: “Small (1905) named *Linum carteri* for plants collected by him in Miami-Dade County in ‘pinelands between Cocconut Grove and Cutler’ in 1905. Just two years later in 1907 Small put it in a segregate genus, calling it *Cathartolinum carteri*. He followed this treatment again [in his flora manuals of] 1913 and 1933. In a 1963 revision of the genus in North America, Rogers noted the close relationship of Florida plants to those in the western United States and renamed the plants as a variety of *L. rigidum*. Small’s concept of this taxon included both pubescent and glabrous plants, with or without stipular glands. In a 1968 study of southern Florida plants, Rogers split the [species] into two varieties, calling [the pubescent plants] *L. carteri* var. *carteri*, and segregating the glabrous plants as *L. carteri* var. *smallii*. He based this division on new genetic data from Mosquin and Hayley (1967) and his own morphological data. *L. carteri* var. *carteri* was treated as endemic to Miami-Dade County, while *L. carteri* var. *smallii* was slightly more widespread in southern Florida. This treatment has been followed by Long and Lakela (1971), Robertson (1971) and Wunderlin (1998).” (Bradley and Gann 1999). Wunderlin and Hansen (2003) continue to use this treatment.

Habitat: *Linum carteri* var. *carteri* “is found in pine rocklands, particularly those that have undergone some sort of soil disturbance.” (Bradley and Gann 1999). None of the known populations are from a completely undisturbed pine rockland. All known occurrences are within scarified pine rocklands, in disturbed areas adjacent to or within rocklands, or in completely disturbed areas. *Linum carteri* var. *carteri* does not tolerate shading or litter accumulation, and therefore may have been excluded from much of its former habitat by fire suppression. Maschinski (2005) reports that “*Linum carteri* var. *carteri* has typical behavior for an early successional species. Higher densities of plants occur at the mown site where competition with other plants is decreased. However, disturbance from mowing either retarded the maturation or kills plants in the population. Because this has been a repeated pressure on the population for more than 50 years, it is possible that mowing is also selecting for plants that can grow and reproduce more rapidly than the disturbed site plants.” Maschinski (2005) also reports that population viability is likely to be greatly influenced by the presence or absence of a persistent seed bank, so future demographic monitoring studies by Fairchild Tropical Botanic Garden will include a seed bank analysis, as well as efforts to determine whether the disturbance regime has a persistent impact on this plant’s life history. Maschinski’s work confirms, to a degree, the comment that “periodic mowing in these areas may partially replace fires, maintaining an open, shrub free understory.” (Bradley and Gann 1999).

Historical Range/Distribution: *Linum carteri* var. *carteri* was restricted to the Miami Rock Ridge in Miami-Dade County. Similar plants from farther west (Big Cypress National Preserve)

belong to *L. carteri* var. *smallii*. *L. carteri* var. *carteri* was found at many locations from the Coconut Grove area of Miami (latitude 25° 43.8') to southern Miami-Dade County, terminating near SW 280 Street (latitude 25° 30.4'), constituting a range of about 24 miles (Bradley and Gann 1999). Austin with Tatje (1980) mapped 17 stations for *Linum carteri* var. *carteri*. Most of those stations are likely to be historic (the report's format did not allow Austin to clearly note where plants had been found during field work). A number have definitely been destroyed. Bradley and Gann (1999) believe that several occurrences represented misidentifications—that the plants were either *Linum arenicola* or *L. carteri* var. *smallii*. A population was extirpated from the Charles Deering Estate by 1999 (K. Bradley and G. Gann, The Institute for Regional Conservation, pers. comm. 1999). It was reported from the Homestead Air Reserve Base but has since disappeared.

Current Range/Distribution: According to Bradley and Gann (1999 and Gann et al. (2002), *Linum carteri* var. *carteri* is known from three conservation lands belonging to Miami-Dade County: Camp Owaissa Bauer, R. Hardy Matheson Preserve, and Rockdale Pineland. A population at a privately owned site called "Old Dixie Pineland" in a pine rockland strip between U.S. Highway 1 and Old Dixie Road south of 272 Street will soon largely be cleared for construction of a busway (K. Bradley in litt. 2005). It is present but not formally protected at the U.S. Department of Agriculture's Subtropical Horticulture Research Station (Chapman Field) (The Institute for Regional Conservation 2004). It is present at one other privately-owned locations in southern Miami-Dade County, which are subject to development: Cocoplum Development Carter's Flax Site. A privately owned site at Ponce and Riviera in Coral Gables was destroyed in the past year (K. Bradley in litt. 2005).

Population Estimates/Status: Bradley and Gann (1999) estimated that fewer than 1,000 individuals existed at 9 occurrences, of which 3 were on conservation lands. Two of these sites (a private pineland and the Homestead Air Reserve Base) have since disappeared. The population at the U.S. Department of Agriculture Subtropical Horticulture Research Station, Miami is in excess of 100 plants, not the 11-100 reported by The Institute for Regional Conservation in 1999 (K. Bradley, The Institute for Regional Conservation, in litt. 2005). Additional information on this plant's appearance, distribution, and ecology is available in Fairchild Tropical Garden's conservation action plan (2001).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Only seven occurrences of this plant remain, three of which are on conservation lands. Residential and commercial development and agriculture have drastically reduced the habitat for *Linum carteri* var. *carteri* throughout pine rockland habitats in south Florida. Pine rockland habitat in Miami-Dade County has been reduced to about 11 percent of its natural extent (Kernan and Bradley 1996). Of the original 74,000 hectares (ha) (182,780 acres), 8,140 ha (20,106 acres) of pine rockland habitat remained in 1996. Less than 2 percent of the 65,000 ha (160,550 acres) of pine rockland habitat that existed outside Everglades National Park in 1900 remains today (Kernan and Bradley 1996). Given that

Miami-Dade County has had a real estate boom from the 1990s through the present, pressures from development are not diminishing, though Miami-Dade County has slowed the rate of loss of pineland remnants by providing conservation incentives to landowners. Habitat loss by itself could result in extinction of *Linum carteri* var. *carteri*.

- B. Overutilization for commercial, recreational, scientific, or educational purposes. None known.
- C. Disease or predation. None known.
- D. The inadequacy of existing regulatory mechanisms. The Florida Department of Agriculture and Consumer Services has designated *Linum carteri*, which includes variety *carteri* and variety *smallii*, as endangered under Chapter 5B-40, Florida Administrative Code. This listing provides little or no habitat protection beyond the State's Development of Regional Impact process, which serves to disclose impacts from projects, but provides no regulatory protection for State-listed plants on private lands. Without local or county ordinances preventing the destruction of the plant, conservation does not occur.
- E. Other natural or manmade factors affecting its continued existence. Fire is required to maintain the pine rockland community. Under natural conditions, lightning fires typically occurred at 3- to 7-year intervals. With fire suppression, hardwoods eventually invade pine rocklands and shade out understory species like *Linum carteri* var. *carteri*. Natural fires are unlikely to occur or will be suppressed in the remaining highly fragmented pine rockland habitat in Miami-Dade County. Preparing for and carrying out prescribed fires tends to be costly.

Invasive exotic plants, especially Burmареed (*Neyraudia reynaudiana*) and Brazilian pepper (*Schinus terebinthifolius*), threaten *Linum carteri* var. *carteri*. The control of exotic species in pine rockland is an essential part of habitat maintenance (Bradley and Gann 1999). Brazilian pepper is the most widespread and one of the most invasive species. If left uncontrolled in a fire-suppressed pineland, it will form a dense single-species canopy almost completely eliminating native vegetation. Earleaf acacia (*Acacia auriculiformis*), natal grass (*Rhynchelytrum repens*), shrub verbena (*Lantana camara*), and tongue tree (*Albizia lebeck*) are some of the other exotic pests in pine rocklands. All of these species affect the characteristics of a fire when it does occur, providing fuel for fires much hotter than when the main fuel was pine needle duff. For instance, a catastrophic fire may favor bracken fern at the expense of grasses. More exotic pest plants could become problems in the future. In much of south Florida (although possibly not urban Miami-Dade), Old World climbing fern (*Lygodium microphyllum*) is a serious threat.

Based on the small numbers of individuals within the species' narrow range, catastrophic events such as hurricanes or tropical storms may negatively impact the species by altering the vegetation composition or water levels, or simply by creating masses of

urban debris that may be disposed of in remnant pinelands (as happened in 1992 with Hurricane Andrew).

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

In 1979, Miami-Dade County enacted the Environmentally Endangered Lands Covenant Program which gives private land owners of pine rockland habitat a tax break if they agree to not develop the property and manage it for a period of ten years (U.S. Fish and Wildlife Service 1999). Miami-Dade County also embarked on a large-scale program, with some state funding, to acquire and manage “environmentally endangered lands” (EEL), including the Rockdale Pineland, where this species occurs. Miami-Dade County sponsored the mapping of natural forest communities (hammocks and pinelands) in the County. This project, using the County’s geographic information system, greatly improves the County’s ability to detect changes in the forest communities, both public and private. Management options for *Linum carteri* var. *carteri* at the Miami-Dade County preserves were carefully assessed by Fairchild Tropical Garden (2001), and they are conducting demographic monitoring at two sites. A population viability assessment will be conducted when enough data are available (Maschinski 2005).

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate)

This species is currently present at only seven remnants of its former pine rockland habitat in the Miami-Dade County agricultural and urban areas. The existing populations are small and vulnerable to exotic pest plant invasions, hot wildfires, and in some cases, to development. Only careful management of this plant on conservation lands can prevent its extinction.

For species that are being removed from candidate status:

___ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3*
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: *Linum carteri* var. *carteri* exists in such small numbers at so few sites, that it may be difficult to develop viable populations on the available conservation lands. “Viable” plant populations for small, short-lived herbs may consist of tens of thousands of plants. Although no population viability analysis has been conducted for this plant, indications are that existing populations are at best marginal, and none are truly viable.

Imminence: All indications are that *Linum carteri* var. *carteri* does not currently exist in sufficient numbers to have viable populations, even if all the sites on conservation lands are well managed and there are no accidents or unexpected happenings.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. There are no threats from unauthorized collecting or Federal projects that would justify emergency listing.

DESCRIPTION OF MONITORING

The Service is cooperating in mapping the pineland habitat of *Linum carteri* var. *carteri*. Because of this and other projects, Service personnel are in contact with Miami-Dade County land managers and botanists at The Institute for Regional Conservation, Fairchild Tropical Botanic Garden, and local universities. The Institute for Regional Conservation tracks localities

and is conducting the field work for the Miami-Dade County mapping project. This project will provide valuable new information on these areas by late 2004, and it will make it possible for Miami-Dade County to track changes in future years. Fairchild Tropical Botanic Garden has conducted conservation activities at one non-conservation site. The Service is also in close contact with land managers regarding exotic pest plant management issues.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: We have not received direct comments from the State of Florida. The state Endangered Plant Advisory Council regularly reviews the status of all species that have federal listed or candidate status.

Indicate which State(s) did not provide any information or comments: Florida

LITERATURE CITED

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005
Acting Regional Director, Fish and Wildlife Service Date



Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: South Florida (Vero Beach) Field Office